Chapter 5 • Quiz 1 Form A

Name ______________________ Period __________ Date ____________

1. Solve the system of equations by using substitution. Be sure to verify your solution by substituting it into both original equations.

$$\begin{cases} 2x + y = 19 \\ x - y = 2 \end{cases}$$

2. Solve the system of equations by using the elimination method. Be sure to verify your solution by substituting it into both original equations.

$$\begin{cases} 2x + 3y = 9 \\ 4x - y = 11 \end{cases}$$

3. Alfonso and Joan sold sandwiches and juice boxes at a football game. The sandwiches cost \$1.75 each, and each juice box cost \$1.10. They sold a total of 540 items (sandwiches and juice boxes) and took in \$730.50. Let s represent the number of sandwiches sold, and let j represent the number of juice boxes sold.

a. Write an equation for the total number of items sold.

b. Write an equation for the total cost of the items.

c. The equations from 3a and b form a system of equations. Solve the system to find the number of sandwiches sold and the number of juice boxes sold.

4. Look back at the system of equations you wrote in Problem 3.

a. Write a matrix to represent the system.

b. Verify your solution in 3c by using row operations to transform your matrix into the form $\begin{bmatrix} 1 & 0 & A \\ 0 & 1 & B \end{bmatrix}$. Show each step and tell what row operation you used.

Name ______________________ **Period** ________ **Date** __________

1. Solve the system of equations by using substitution. Be sure to verify your solution by substituting it into both original equations.

$$\begin{cases} 3x - y = 6 \\ x - y = -4 \end{cases}$$

2. Solve the system of equations by using the elimination method. Be sure to verify your solution by substituting it into both original equations.

$$\begin{cases} 5x + 3y = 26 \\ 2x - y = 6 \end{cases}$$

3. Josh and Racquel sold cookies and brownies at the math club bake sale. The cookies cost \$0.35 each, and the brownies cost \$0.75 each. They sold a total of 600 items (cookies and brownies) and raised \$360. Let c represent the number of cookies sold, and let b represent the number of brownies sold.

a. Write an equation for the total number of items sold.

b. Write an equation for the total cost of the items.

c. The equations from 3a and b form a system of equations. Solve the system to find the number of cookies and brownies sold.

4. Look back at the system of equations you wrote in Problem 3.

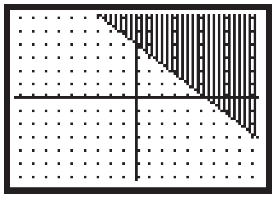
a. Write a matrix to represent the system.

b. Verify your solution in 3c by using row operations to transform your matrix into the form $\begin{bmatrix} 1 & 0 & A \\ 0 & 1 & B \end{bmatrix}$. Show each step and tell which row operations you used.

Chapter 5 • Quiz 2 **Form A**

Name ______________________________ **Period** __________ **Date** ______________

1. In this graph, the scale on both axes is 1.



$[-10, 10, 1, -7, 7, 1]$

a. Assume the line is solid. Write the inequality the graph represents.

b. Assume the line is dotted. Write the inequality the graph represents.

2. Graph the system of inequalities and indicate the solution.

$$\begin{cases} y > -3 \\ y \leq 2x + 1 \end{cases}$$

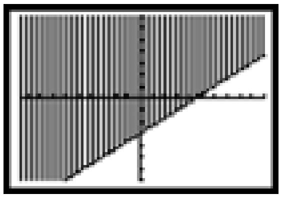
3. Solve the inequality $-3x + 4 > 16$, showing each step of your solution. Graph the solution on a number line.

4. Sofia wants to visit her aunt in Italy next summer. She estimates that she will need at least \$600 for the trip. Her grandmother gave her \$100 to put toward the trip. Sofia has a part-time job and thinks she can save \$75 of her earnings each month. Write and solve an inequality to determine how many months Sofia will need to save in order to have enough money for the trip.

Chapter 5 • Quiz 2 Form B

Name ______________________ **Period** __________ **Date** ____________

1. In this graph, the scale on both axes is 1.



$[-10, 10, 1, -7, 7, 1]$

a. Assume the line is solid. Write the inequality the graph represents.

b. Assume the line is dotted. Write the inequality the graph represents.

2. Graph the system of inequalities and indicate the solution.

$$\begin{cases} y < 2 \\ y \geq 3x - 2 \end{cases}$$

3. Solve the inequality $-2x + 5 < 13$, showing each step of your solution. Graph the solution on a number line.

4. Jon wants to visit his aunt in Australia next summer. He estimates that he will need at least $1,200 for the trip. His father said he would give him $550 toward the trip. Jon has a part-time job and thinks he can save $75 of his earnings each month. Write and solve an inequality to determine how many months Jon will need to save in order to have enough money for the trip.

Name ______________________ **Period** __________ **Date** ______________

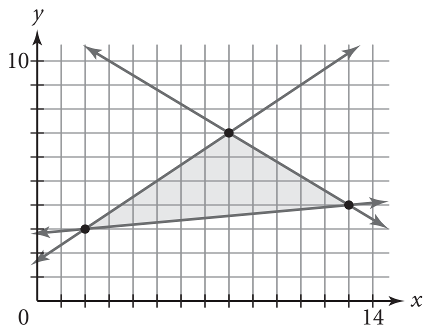
1. Consider this system of equations.

$$\begin{cases} 3x + 5y = 7 \\ 2x - y = 9 \end{cases}$$

a. Solve the system by using substitution or elimination. Check your solution by substituting it into both equations.

b. Write both equations in intercept form. Graph the equations and verify that the point of intersection is the solution of the system.

2. Write a system of inequalities to describe the shaded area of the graph. In the inequalities, express the slopes of the lines in fraction form.



3. Consider the inequality $700 + x \geq 130 - 59x$.

a. Solve the inequality, showing each step of your solution.

b. Explain how you could check your solution by graphing two equations on a calculator. (Do not actually graph the equations.)

4. The Creekside Theater is putting on a play. The Hanson family bought five adult tickets and three child tickets for \$131.25. The Rivera family bought three adult tickets and four child tickets for \$106.25.

a. Write a system of equations to represent this situation.

b. Use matrices to solve the system. Show each step of your solution and tell which row operation you used. How much does an adult ticket cost? How much does a child ticket cost?

5. Complete each sentence.

a. When two equations have the same slope, the lines they represent are ______________.

b. When you solve an inequality, you need to change the direction of the inequality symbol when you ______________.

c. If a system of linear equations has an infinite number of solutions, then the graphs of the equations ______________.

Challenge Problem

Solve the system of equations.

$$\begin{cases} 2x + 4y - z = -3 \\ x + y + z = 2 \\ -5x - y + 3z = -10 \end{cases}$$

Name ______________________________ Period __________ Date ____________

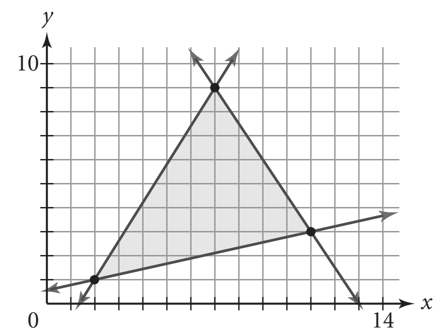
1. Consider this system of equations:

$$\begin{cases} 2x - 3y = 2 \\ 3x - y = 10 \end{cases}$$

a. Solve the system by using substitution or elimination. Check your solution by substituting it into both equations.

b. Write both equations in intercept form. Graph the equations and verify that the point of intersection is the solution of the system.

2. Write a system of inequalities to describe the shaded area of the graph. In the equalities, express the slopes of the lines in fraction form.



3. Consider the inequality $6 - 2x \leq 9 + 8x$.

a. Solve the inequality, showing each step of your solution.

b. Explain how you could check your solution by graphing two equations. (Do not actually graph the equations.)

4. The Creekside Theater is putting on a play. The Hanson family bought five adult tickets and two child tickets for \$129.00. The Rivera family bought two adult tickets and six child tickets for \$107.50.

a. Write a system of equations to represent this situation.

b. Use matrices to solve the system. Show each step of your solution and tell which row operation you used. How much does an adult ticket cost? How much does a child ticket cost?

5. Complete each sentence.

a. When the equations in a linear system have different slopes, then the system has ____________ solution(s).

b. When you solve an inequality, you need to change the direction of the inequality symbol when you ____________.

c. If a system of linear equations has no solution, then the graphs of the equations ____________.

Challenge Problem

Solve the system of equations.

$$\begin{cases} 2x - 4y + z = 12 \\ x + y + z = 5 \\ -5x + 2y - 2z = -20 \end{cases}$$

Chapter 5 • Constructive Assessment Options

Choose one or more of these items to replace part of the chapter test. Let students know that they will receive from 0 to 5 points for each item depending on the correctness and completeness of their answer.

1. *(Lesson 5.1)*
A door is on one wall of a classroom, and a set of windows is on the opposite wall. Sketch a graph to represent each situation, with the x-axis representing time and the y-axis representing distance from the door. You do not need to show specific scale values. Label each line with the student's name.

a. Emily starts at the windows walking toward the door, and Alison starts at the door walking toward the windows. Each girl walks at a steady pace toward the opposite wall.

b. Emily starts at the windows. Alison starts a few feet in front of the windows. Each girl walks toward the door at a steady pace. Emily gets to the door first.

c. Alison starts at the door. Emily starts a few feet in front of the door. Each girl walks toward the windows at a steady pace. Alison gets to the windows first.

d. Emily starts at the windows. Alison starts a few feet in front of the windows. Both girls walk at a steady pace toward the door, keeping the same distance between them the whole way.

2. *(Lessons 5.2–5.4)*
Keaton solved these three systems as part of his homework. For each system, tell whether his solution is correct. If it is incorrect, explain what he did wrong and give the correct solution steps.

a. $\begin{cases} y = 4x - 9 \\ y = -2x + 1 \end{cases}$

$$\begin{aligned} 4x - 9 &= -2x + 1 \\ -9 &= 2x + 1 \\ -10 &= 2x \\ -5 &= x \end{aligned}$$

$y = 4(-5) - 9$
$y = -29$

$(-5, -29)$

b. $\begin{cases} x - 2y = 2 \\ 3x - 5y = 7 \end{cases}$

$x = 2 + 2y$

$$\begin{aligned} 3(2 + 2y) - 5y &= 7 \\ 6 + 6y - 5y &= 7 \\ 6 + y &= 7 \\ y &= 1 \end{aligned}$$

$x - 2(1) = 2$
$x = 4$

$(4, 1)$

c. $\begin{cases} x - y = -11 \\ x + y = 1 \end{cases}$

$$\begin{array}{r} x - y = -11 \\ \underline{x + y = 1} \\ 2x = 12 \\ x = 6 \end{array}$$

(continued)

3. *(Lessons 5.1–5.4)*
Write a system of two equations that satisfies each condition. Then prove that the system satisfies the condition by solving it symbolically.

a. Both coordinates of the solution are negative integers.

b. The graphs of both equations cross the y-axis at 5.

c. The graphs of the equations do not intersect.

d. The solution is (0, 0).

4. *(Lessons 5.1–5.4)*
Quick Cam and Fun Photo both make prints of pictures taken with digital cameras. Quick Cam charges a \$5 setup fee, plus \$0.99 per print. Fun Photo charges a \$3.50 setup fee, plus \$1.05 per print. Tell whether each statement is true or false, and explain how you know.

a. There is no number of prints for which the cost is the same at both stores.

b. The equation $c = 0.99 + 5p$ can be used to calculate the cost, c, of having p prints made at Quick Cam.

c. It is always cheaper to have prints made at Fun Photo.

d. If Len paid \$24.80 for 20 prints at one of the stores, he must have gone to Quick Cam.

5. *(Lessons 5.2–5.4)*
Write a word problem that can be solved by writing and solving a system of equations. The solution to the system must be (3, 13). Show a complete solution to your problem.

6. *(Lesson 5.5)*
Sam was absent when his class worked with linear inequalities in one variable. Sarah told him, "If you can solve equations, then you can solve inequalities. There are only a couple of new things you need to know." Write a note to Sam explaining how to solve linear inequalities. (Assume he knows how to solve equations.) Also explain how to graph an inequality on a number line.

(continued)

7. *(Lesson 5.7)*
Luis told his sister Rosi, "If you can guess the amount of money in my piggy bank, you can have it. The bank contains only dimes and quarters. There are no more than eight quarters and no more than four dimes. I have at least ten coins in all."

a. Write a system of inequalities for this situation.

b. Make a graph showing the solution of the system of inequalities.

c. How many different combinations of coins are possible? Explain how you found your answer.

d. If Luis has less than $2.00 in his piggy bank, how many of each coin must he have? Explain how you found your answer.

8. *(Lesson 5.7)*
Write a system of linear inequalities that satisfies the given criteria. Graph the system and indicate the solution.

a. The solution includes points in Quadrants III and IV only.

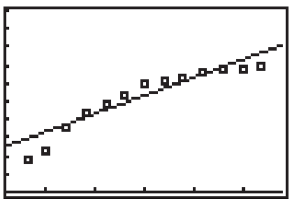
b. The solution includes points in every quadrant but Quadrant IV.

c. All the points in the solution have two positive coordinates.

d. The solution includes points in every quadrant but Quadrant I.

7. **5 Points**

a. The equation of the line and the data are correctly shown. The description of the method for finding the line is clear and correct. The explanation of how well the equation fits is clearly presented. Sample answer: I found the Q-line. I first found the Q-points. The quartiles of the *year* data are 1983 and 1997, and the quartiles of the *percentage* data are 39.35 and 67.05. Because the data values are increasing, the line of fit passes through the Q-points (1983, 39.35) and (1997, 67.05). The slope of the line through these points is $\frac{67.05 - 39.35}{1997 - 1983} = \frac{27.7}{14} \approx 1.98$. This slope and the point (1983, 39.35) give the equation $y = 39.35 + 1.98(x - 1983)$. I graphed the points and the equation.



[1976, 2004, 5, 0, 100, 10]

The line is a pretty good fit for most of the data, particularly from about 1982 to 1998. It shows the general direction of the data until about 2000. There are about the same number of points above as below the line.

b. The answer is clear and convincing and is based on the data and the graph. Sample answer: The equation indicates that the average percentage increase is about 1.98% each year. However, the data show that the rate of increase in the early years (from 1978 to 1982) was greater than 1.98%, and in the later years (since the mid-'90s) has been less. So I would predict that the model will not accurately predict the percentage of households using cable over the next 10 to 15 years. Over that period of time the percentage may go up, but I predict it will be by less than 1% a year, and in some years there may be a decrease.

3 Points

a. The equation fits the data reasonably well. The description of the method and explanation of why the line is a good fit are missing minor details. Sample answer: I got the equation $y = 67.4 + 2.025(x - 1998)$ by plotting the data and finding a line through two of the points. I graphed the points and the line on my calculator and could see that the line fits very well.

b. The prediction is reasonable, but it is not strongly tied to the data or the equation. Possible answer: I think the percentage will keep increasing because many people are getting digital cable and cable modems for their computers.

1 Point

a. A reasonable equation is given, but both the description of the method and the explanation of why the line fits are missing, or the equation, description, and explanation are given, but the line is not a good fit and the explanation of why it fits is not convincing. Sample answer: I got the equation $y = 43.7 + 1.7(x - 1984)$ by plotting the data and finding a line through two of the points. The line fits because it goes in the same direction as the points and contains two of the points.

b. The prediction is unreasonable and is not tied to the data or the equation. Possible answer: I think the percentage will start going down by a lot because more people are getting satellite dishes instead of cable.

8. **5 Points**

Answers are correct. Explanations are thorough and demonstrate an understanding of important concepts.

a. False. Possible explanation: The population has increased by about 160 million people every 2 years, not every year.

b. True. Possible explanation: The appropriate Q-points are (1978, 4.302) and (1996, 5.771). The slope of the line through these points is about 0.082. Using the point (1978, 4.302), we get the equation $y = 0.082(x - 1978) + 4.302$.

c. False. Possible explanation: Substituting 1999 into the model gives a population value of 6.024 billion people, so 1999, not 2000, is the first year the population was 6 billion or greater.

d. False. Possible explanation: The change from 1986 to 1988 was 172 million people, but the change from 1988 to 1990 was 175 million people.

3 Points

At least three answers are correct. Explanations are well written, but a few minor details are missing or incorrect.

1 Point

Answers are correct, but no explanations are given, or only one answer is correct, but it has a good, clear explanation.

CHAPTER 5 • Quiz 1 — Form A

1. $x = 7, y = 5$

2. $x = 3, y = 1$

3. **a.** $s + j = 540$

b. $1.75s + 1.10j = 730.50$

c. 210 sandwiches and 330 juice boxes

4. a. $\begin{bmatrix} 1 & 1 & 540 \\ 1.75 & 1.10 & 730.50 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 1 & 540 \\ 1.75 & 1.10 & 730.50 \end{bmatrix}$ Original matrix.

$\begin{bmatrix} 1 & 1 & 540 \\ 0 & -0.65 & -214.50 \end{bmatrix}$ Multiply row 1 by -1.75 and add result to row 2.

$\begin{bmatrix} 1 & 1 & 540 \\ 0 & 1 & 330 \end{bmatrix}$ Divide row 2 by -0.65.

$\begin{bmatrix} 1 & 0 & 210 \\ 0 & 1 & 330 \end{bmatrix}$ Multiply row 2 by -1 and add result to row 1.

CHAPTER 5 • Quiz 1 Form B

1. $x = 5, y = 9$

2. $x = 4, y = 2$

3. a. $c + b = 600$ **b.** $0.35c + 0.75b = 360$

c. 225 cookies, 375 brownies

4. a. $\begin{bmatrix} 1 & 1 & 600 \\ 0.35 & 0.75 & 360 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 1 & 600 \\ 0.35 & 0.75 & 360 \end{bmatrix}$ Original matrix.

$\begin{bmatrix} 1 & 1 & 600 \\ 0 & 0.40 & 150 \end{bmatrix}$ Multiply row 1 by -0.35 and add to row 2.

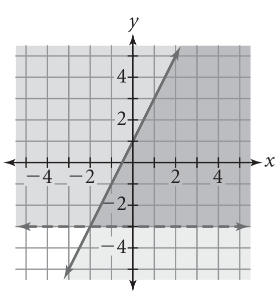
$\begin{bmatrix} 1 & 1 & 600 \\ 0 & 1 & 375 \end{bmatrix}$ Divide row 2 by 0.4.

$\begin{bmatrix} 1 & 0 & 225 \\ 0 & 1 & 375 \end{bmatrix}$ Multiply row 2 by -1 and add to row 1.

CHAPTER 5 • Quiz 2 Form A

1. a. $y \geq 4 - \frac{4}{5}x$ **b.** $y > 4 - \frac{4}{5}x$

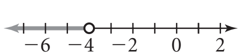
2. The overlap of the shaded regions is the solution of the system.



3. $-3x + 4 > 16$

$-3x > 12$

$x < -4$



4. Let m be the number of months she will need to save.

$100 + 75m \geq 600$

$75m \geq 500$

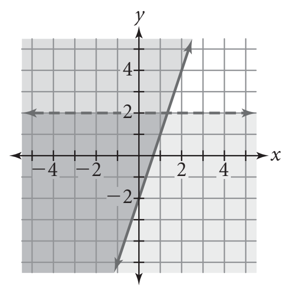
$m \geq 6.\overline{6}$

Sofia will need to save for at least seven months in order to have enough money for the trip.

CHAPTER 5 • Quiz 2 Form B

1. a. $y \geq \frac{2}{3}x - 3$ **b.** $y > \frac{2}{3}x - 3$

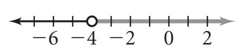
2. The overlap of the shaded regions is the solution of the system.



3. $-2x + 5 < 13$

$-2x < 8$

$x > -4$



4. Let m be the number of months he will need to save.

$550 + 75m \geq 1200$

$75m \geq 650$

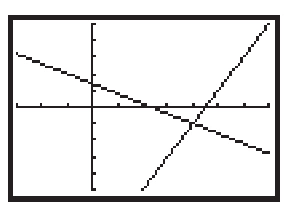
$m \geq 8.\overline{6}$

Jon will need to save for at least nine months in order to have enough money for the trip.

CHAPTER 5 • Test Form A

1. a. $x = 4, y = -1$

b. $y = -\frac{3}{5}x + \frac{7}{5}, y = 2x - 9$; the graphs intersect at $(4, -1)$.



$[-3, 7, 1, -5, 5, 1]$

2. Inequalities should be equivalent to those in this system:

$$\begin{cases} y \geq 4 + \frac{1}{11}(x - 13) \\ y \leq 3 + \frac{2}{3}(x - 2) \\ y \leq 7 - \frac{3}{5}(x - 8) \end{cases}$$

3. a.

$$\begin{aligned} 700 + x &\geq 130 - 59x \\ 700 + 60x &\geq 130 \\ 60x &\geq -570 \\ x &\geq -9.5 \end{aligned}$$

b. You could enter $y_1 = 700 + x$ and $y_2 = 130 - 59x$, and look for the x-values for which $y_1 \geq y_2$.

4. a. Let a be the price of an adult ticket, and let c be the price of a child ticket.

$$\begin{cases} 5a + 3c = 131.25 \\ 3a + 4c = 106.25 \end{cases}$$

b. $\begin{bmatrix} 5 & 3 & 131.25 \\ 3 & 4 & 106.25 \end{bmatrix}$ Original matrix.

$\begin{bmatrix} 1 & 0.6 & 26.25 \\ 3 & 4 & 106.25 \end{bmatrix}$ Divide row 1 by 5.

$\begin{bmatrix} 1 & 0.6 & 26.25 \\ 0 & 2.2 & 27.5 \end{bmatrix}$ Subtract 3 times row 1 from row 2.

$\begin{bmatrix} 1 & 0.6 & 26.25 \\ 0 & 1 & 12.5 \end{bmatrix}$ Divide row 2 by 2.2.

$\begin{bmatrix} 1 & 0 & 18.75 \\ 0 & 1 & 12.5 \end{bmatrix}$ Subtract 0.6 times row 2 from row 1.

$a = 18.75$ and $c = 12.5$; an adult ticket costs \$18.75, and a child ticket costs \$12.50.

5. a. parallel

b. multiply or divide both sides by a negative number

c. are the same

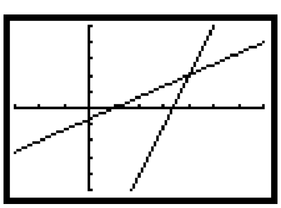
Challenge Problem

$x = 3, y = -2, z = 1$

CHAPTER 5 • Test Form B

1. a. $x = 4, y = 2$

b. $y = \frac{2}{3}x - \frac{2}{3}$, $y = 3x - 10$; the graphs intersect at (4, 2).



$[-3, 7, 1, -5, 5, 1]$

2. Inequalities should be equivalent to those in this system:

$$\begin{cases} y \geq 3 + \frac{2}{9}(x - 11) \\ y \leq 9 - \frac{3}{2}(x - 7) \\ y \leq 9 + \frac{8}{5}(x - 7) \end{cases}$$

3. a.

$$\begin{aligned} 6 - 2x &\leq 9 + 8x \\ 6 &\leq 9 + 10x \\ -3 &\leq 10x \\ -0.3 &\leq x \end{aligned}$$

b. You could enter $y_1 = 6 - 2x$ and $y_2 = 9 + 8x$, and look for the x-values for which $y_1 \leq y_2$.

4. a. Let a be the price of an adult ticket, and let c be the price of a child ticket.

$$\begin{cases} 5a + 2c = 129 \\ 2a + 6c = 107.5 \end{cases}$$

b. $\begin{bmatrix} 5 & 2 & 129 \\ 2 & 6 & 107.5 \end{bmatrix}$ Original matrix.

$\begin{bmatrix} 1 & 0.4 & 25.8 \\ 2 & 6 & 107.5 \end{bmatrix}$ Divide row 1 by 5.

$\begin{bmatrix} 1 & 0.4 & 25.8 \\ 0 & 5.2 & 55.9 \end{bmatrix}$ Subtract 2 times row 1 from row 2.

$\begin{bmatrix} 1 & 0.4 & 25.8 \\ 0 & 1 & 10.75 \end{bmatrix}$ Divide row 2 by 5.2.

$\begin{bmatrix} 1 & 0 & 21.5 \\ 0 & 1 & 10.75 \end{bmatrix}$ Subtract 0.4 times row 2 from row 1.

$a = 21.5$ and $c = 10.75$; an adult ticket costs \$21.50, and a child ticket costs \$10.75.

5. a. one

b. multiply or divide both sides by a negative number

c. are parallel

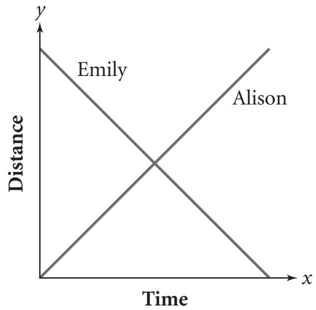
Challenge Problem

$x = 2, y = -1, z = 4$

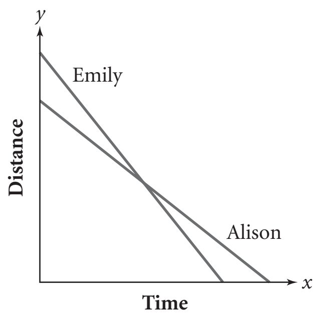
SCORING RUBRICS

1. 5 Points

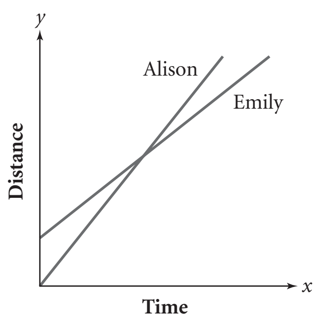
a. Lines have the same relative positions as those shown here.



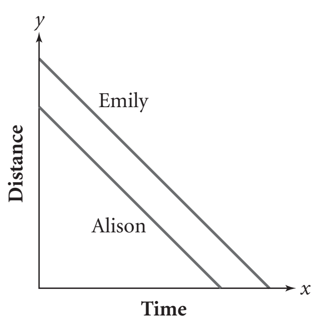
b. Lines have the same relative positions as those shown here.



c. Lines have the same relative positions as those shown here.



d. Lines have the same relative positions as those shown here.



3 Points
Three graphs are correct.

1 Point
One graph is correct.

2. 5 Points
Keaton's mistakes are explained and correct solutions given. The solution steps may vary from those shown.

a. He made an error when he tried to subtract $4x$ from both sides. On the right side, he added $4x$, getting $2x + 1$ instead of $-6x + 1$. Here is the correct solution.

$$4x - 9 = -2x + 1$$
$$-9 = -6x + 1$$
$$-10 = -6x$$
$$\frac{5}{3} = x$$
$$y = 4\left(\frac{5}{3}\right) - 9$$
$$y = -\frac{7}{3}$$

The solution is $\left(\frac{5}{3}, -\frac{7}{3}\right)$.

b. His solution is correct.

c. He made a mistake when he added the equations. Because $-11 + 1 = -10$, the right side of the equation should be -10, not 12. He also forgot to substitute his answer for x into one of the original equations to find y. Here is the correct solution.

$$x - y = -11$$
$$\underline{x + y = 1}$$
$$2x = -10$$
$$x = -5$$
$$-5 + y = 1$$
$$y = 6$$

The solution is $(-5, 6)$.

3 Points
Keaton's mistakes are correctly identified, but solution steps may contain one or two errors, or correct solution steps are given, but the explanations of what Keaton did wrong are incomplete.

1 Point
The mistakes are identified, but correct solutions are not given, or the mistakes are not explained, but the correct solution is given for at least one.

3. **5 Points**
Systems satisfy the conditions. Solutions are correct and complete.

a. Sample answer:

$$\begin{cases} y = 2x \\ y = 3x + 3 \end{cases}$$

$y = 3x + 3$	Original second equation.
$2x = 3x + 3$	Substitute $2x$ (from the first equation) for y.
$-3 = x$	Subtract $2x$ and 3 from both sides.

$y = 2(-3)$
$y = -6$

The solution is $(-3, -6)$, so both coordinates of the solution are negative integers.

b. Sample answer:

$$\begin{cases} y = 2x + 5 \\ y = -3x + 5 \end{cases}$$

$y = -3x + 5$	Original second equation.
$2x + 5 = -3x + 5$	Substitute $2x + 5$ (from the first equation) for y.
$0 = -5x$	Subtract 5 and $2x$ from both sides.
$0 = x$	Divide both sides by -5.

$y = 2(0) + 5$
$y = 5$

The solution is $(0, 5)$, so both graphs cross the y-axis at 5.

c. Sample answer:

$$\begin{cases} y = 2x + 2 \\ y = 2x + 3 \end{cases}$$

Subtract the second equation from the first to get $0 = -1$. Because $0 = -1$ is never true, the system has no solutions. This means that the lines never intersect.

d. $\begin{cases} y = x \\ y = -x \end{cases}$

Adding the equations gives $2y = 0$, so $y = 0$ and $x = 0$. The solution is $(0, 0)$.

3 Points
Three of the systems are correct. Solution steps may include minor errors.

1 Point
One of the systems and its solution are correct.

4. **5 Points**
Answers are correct. Explanations are thorough and demonstrate an understanding of important concepts.

a. False. Possible explanation: If p is the number of prints and c is the cost in dollars, then the situation can be represented by this system:

$$\begin{cases} c = 5 + 0.99p & \text{Quick Cam} \\ c = 3.5 + 1.05p & \text{Fun Photo} \end{cases}$$

The solution of this system is (25, 29.75). So, for 25 prints, both stores charge $29.75.

b. False. Possible explanation: $5 is the start-up cost (the y-intercept), and $0.99 per picture is the rate of change (the slope). So the equation is $c = 5 + 0.99p$.

c. False. Possible explanation: The solution of the system (see answer to part a) is (25, 29.75), so Fun Photo is cheaper for up to 25 prints. For 25 prints, the costs are the same. For more than 25 prints, Quick Cam is cheaper.

d. True. Possible explanation: If you substitute 20 for p in the Quick Cam equation, $c = 5 + 0.99p$, you get 24.80. If you substitute 20 for p in the Fun Photo equation, $c = 3.5 + 1.05p$, you get 24.50.

3 Points
At least three answers are correct. Explanations are well written, but a few minor details are missing or incorrect.

1 Point
Answers are correct, but no explanations are given, or only one answer is correct, but it has a good, clear explanation.

5. **5 Points**
The problem is clearly stated and satisfies the given conditions. A correct, clear solution is shown.
Sample answer:

Problem: Chen and Roberto are running toward each other. Chen starts 25 m from the school and runs toward the school at a rate of 4 m/s. Roberto starts 4 m from the school and runs away from the school at a rate of 3 m/s. Where and when will the boys meet?

Solution: If y represents the distance from the school in meters and x represents the time in seconds, then the situation can be modeled by this system.

$$\begin{cases} y = 25 - 4x & \text{Chen} \\ y = 4 + 3x & \text{Roberto} \end{cases}$$

Set the right sides equal to each other and solve for x.

$25 - 4x = 4 + 3x$	Set the right sides equal.
$21 = 7x$	Subtract 4 from both sides and add $4x$ to both sides.
$3 = x$	Divide both sides by 7.

$y = 25 - 4(3)$

$y = 13$

The solution is (3, 13), so the boys meet after 3 s when they are 13 m from the school.

3 Points
The problem fits the conditions, but the solution is missing some steps or contains minor mistakes.

1 Point
An attempt is made to write a problem fitting the criteria, and work is shown, but the problem is incorrect.

6. 5 Points
The answer is clear and includes the following points:

- When you add a number to or subtract a number from both sides of an inequality, the direction of the inequality symbol stays the same.
- When you multiply or divide both sides of an inequality by a positive number, the direction of the inequality symbol stays the same.
- When you multiply or divide both sides of an inequality by a negative number, the direction of the inequality symbol is reversed.
- If an inequality is of the form $x < a$ or $x > a$, graph it by first making an open circle at a. For $x < a$, draw an arrow through all the values to the left of a. For $x > a$, draw an arrow through all the values to the right of a.
- If an inequality is of the form $x \leq a$ or $x \geq a$, graph it by first making a solid circle at a. For $x \leq a$, draw an arrow through all the values to the left of a. For $x \geq a$, draw an arrow through all the values to the right of a.
- For a compound inequality, such as $-2 \leq x < 4$, make open or solid circles at the numbers (depending on the signs of the inequalities) and draw a line segment through all the values in between.

3 Points
The answer mentions that the inequality symbol is reversed when both sides are multiplied or divided by a negative number. Two of the other points from the list are missing. Other minor details may also be missing.

1 Point
Four major concepts from the list are missing.

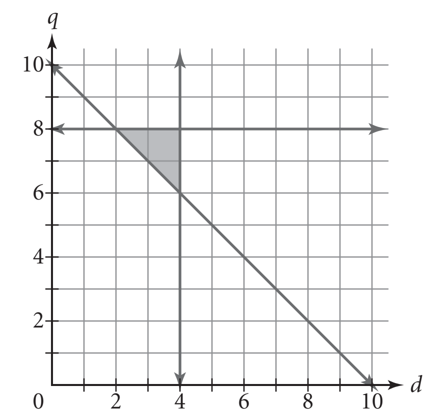
7. 5 Points
Answers are correct. Explanations in parts c and d are clear.

a. If d is the number of dimes and q is the number of quarters, then the system is

$$\begin{cases} d \geq 0 \\ q \geq 0 \\ d \leq 4 \\ q \leq 8 \\ d + q \geq 10 \end{cases}$$

Some students may not write $d \geq 0$ or $q \geq 0$. You may choose to give them full credit or to give them 4 points.

b. The solution is the shaded region of the graph.



c. There are six possible combinations. Possible explanation: The points with integer coordinates in the solution region represent the possible combinations. For example, the point (2, 8) represents two dimes and eight quarters. There are six such points in the solution region.

d. Four dimes, six quarters. Possible explanation: I listed all the possible combinations and found the value of each. Only one combination, four dimes and six quarters, has a value less than $2.00.

Dimes	Quarters	Total
2	8	$2.20
3	8	$2.30
4	8	$2.40
3	7	$2.05
4	7	$2.15
4	6	$1.90

3 Points

a. The system includes the last three restraints.

b. The graph is correct.

c. The answer is correct, but the explanation is unclear, or the answer is incorrect due to minor errors (for example, the student attempts to list the

combinations but forgets one or lists one twice), but the explanation is clear and logical.

d. The answer is correct, but the explanation is unclear, or the answer is incorrect due to minor errors, but the explanation is clear and logical.

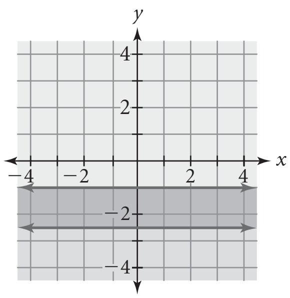
1 Point
The system and graph are mostly correct. Parts c and d are missing or incorrect.

8. 5 Points
Systems satisfy the conditions, and graphs and solutions are correct.

a. Sample answer:

$$\begin{cases} y \le -1 \\ y \ge -2.5 \end{cases}$$

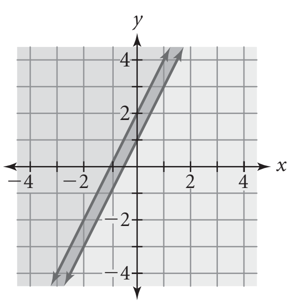
The region of overlap is the solution.



b. Sample answer:

$$\begin{cases} y \le 2x + 2 \\ y \ge 2x + 1 \end{cases}$$

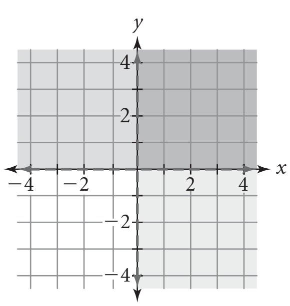
The region of overlap is the solution.



c. Sample answer:

$$\begin{cases} x > 0 \\ y > 0 \end{cases}$$

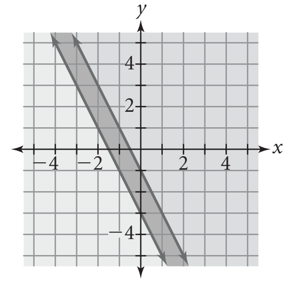
The region of overlap is the solution.



d. Sample answer:

$$\begin{cases} y \le -2x - 1 \\ y \ge -2x - 3 \end{cases}$$

The region of overlap is the solution.



3 Points
Three answers are correct.

1 Point
Only one answer is correct.

CHAPTER 6 • Quiz 1 — Form A

1. a.

Year	Years since 2000, x	Ticket price, y (\$)
2000	0	125.00
2001	1	128.75
2002	2	132.61
2003	3	136.59
2004	4	140.69
2005	5	144.91

b. 1.03 **c.** $y = 125(1 + 0.03)^x$

d. Year 9, or 2009

2. a. $y = 4.98(1 + 0.04)^x$, where x is the number of years from now and y is the price of the cereal

b. \$5.60 **c.** 11 years from now

CHAPTER 6 • Quiz 1 — Form B

1. a.

Year	Years since 2000, x	Ticket price, y (\$)
2000	0	115.00
2001	1	119.60
2002	2	124.38
2003	3	129.36
2004	4	134.53
2005	5	139.92

b. 1.04 **c.** $y = 115(1 + 0.04)^x$

d. Year 10, or 2010